1991

School injuries : a comparison of type and severity on turfed and non-turfed playgrounds

Katherine J. Harper
San Jose State University

Order Number 1345805

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Harper, Katherine J., M.S.N.

San Jose State University, 1991

SCHOOL INJURIES: A COMPARISON OF TYPE AND SEVERITY ON TURFED AND NON-TURFED PLAYGROUNDS

A Thesis

Presented to

The Faculty of the Department of Nursing

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

By

Katherine J. Harper

August, 1991

APPROVED FOR THE DEPARTMENT OF NURSING

Virginia Young

Virginia Young, Dr.P.H., R.N.

Virgil Parsons

Virgil Parsons, D.N.Sc., R.N.

Marcia Arnold

Marcia Arnold, M.A., R.N.

APPROVED FOR THE UNIVERSITY

M. Lou Lewandowski

ABSTRACT

SCHOOL INJURIES: A COMPARISON OF TYPE AND SEVERITY ON TURFED AND NON-TURFED PLAYGROUNDS

Katherine J. Harper

This study explores the differences between severity and type of injuries on two elementary school playground surfaces, turfed (grass) and non-turfed (dirt/gravel). Playground size and utilization at the two schools examined are comparable. The sample of school children studied (N=1,267) has similar demographic characteristics. Using a descriptive study design, data regarding severity and type of injuries on the playgrounds were collected from the Nurse's Office Log at both schools.

The results indicate that severity and type of injuries are dependent on the playground surface. There were more severe injuries of all types studied (orthopedic, abrasion/laceration, head, ophthalmic, and dental) on the non-turfed playground. However, type of injuries varied according to playground surface. Orthopedic and eye injuries were significantly higher on the turfed playground, while abrasions and lacerations were significantly more frequent on the non-turfed playground. Recommendations and implications for school nursing practice are discussed.

ACKNOWLEDGEMENTS

To my husband, Richard, for his unconditional support, patience, and encouragement,

To my son, James, for his understanding and tolerance,

To my mother for her many hours of help with myself and my family,

To my thesis readers, Dr. Virginia Young, Dr. Virgil Parsons, and Ms. Marcia Arnold for their advice and expertise.

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Chapter 1

INTRODUCTION

Injuries represent the single greatest threat to the health and well-being of United States children (Boyce, 1984, p. 984). According to Boyce, a large number of childhood injuries are sustained in schools since 33% of the school-aged child's time is spent there. Children can suffer serious injuries, especially if they fall on a hard surface. School yard injuries sustained on turfed (grass) and non-turfed (dirt/gravel) playgrounds are the focus of this study.

Background of the Problem

Injuries to children while at school are a major concern to school nurses, school administrators, teachers, and parents. As educators, we stand "in loco parentis"--in place of parents--to our students. Teachers and administrators owe the same standard of care to their students as parents owe their children (Mitchell, 1990, p. 44). According to Mitchell, it has been estimated that there are between 1,200 and 3,000 lawsuits brought against teachers and school administrators every year (p. 45). Lawsuits are costly in terms of money, time, and emotional energy. School Boards are becoming increasingly aware of the financial liability of school-related injuries. School Boards, as well as health departments that provide school

health services, have a responsibility to understand the nature of and reasons for injuries in schools (Sheps, 1987). In addition to medical liability issues, loss of school time due to student injury results in a loss of revenue for the school from state average daily attendance (ADA) reimbursement. For every unexcused school day, the school loses $33.00. Parents of children injured during school time may seek financial compensation from the School District for loss of work time as they seek medical attention for their injured child (Frost, 1986).

In a study by the National Electronic Injury Survey System, 59% of school playground injuries resulted from falls to hard surfaces (Frost, 1986). Due to drastic budget reductions for California's educational system during the last 3 years, new state-of-art school buildings are being constructed without adequate monies for school ground landscaping. During recesses and lunch periods, children are playing on dirt lots with many associated environmental hazards, such as rocks, broken glass, construction materials, and unstable earth.

Purpose and Significance

The purpose of this study is to examine three factors associated with school yard injuries on turfed and non-turfed school playgrounds. While improper supervision is the basis for most negligence suits, a proven way to

reduce potential accidents and injuries is to work to eliminate the circumstances in which accidents occur (Green, 1985, p. 2). Prior research has established that surface materials are the most serious causal factors in playground accidents (Wilkinson & Lockhart, 1982).

This study focuses on the following three factors:

1. Severity of injuries,

2. Type of injuries,

3. Nurse's Office visits resulting from injuries, and their relationship to two different playground surfaces at two elementary schools.

Research Questions

The following questions are explored in this study:

1. Is there a difference between the severity of injuries on turfed and non-turfed playgrounds?

2. Is there a difference between the types of injuries on turfed and non-turfed playgrounds?

3. Is there a difference between the number of injury-related Nurse's Office visits resulting from injuries on turfed and non-turfed playgrounds?

Definition of Terms

For the purpose of this study, the following definitions apply:

1. Health Clerk is an individual trained in first aid and office duties working in the School Nurse's Office

(Researcher's Unified School District job description, 1985).

2. Non-turfed playground is a playground without grass, consisting of dirt, rocks, and other naturally occurring ground cover in a semi-arid climate (Webster, 1983, p. 1970).

3. Nurse's Office Log is a chronological record of visits to the School Nurse's Office, including information regarding name, grade level, reason for visit, treatment, and disposition of the case (Appendix A).

4. School-aged child is a child between the ages of 6 and 13 in grades 1 through 6 (Blake, Wright, Howell, & Waechter, 1970).

5. School nurse is a registered nurse with a Bachelor's degree and a School Nurse Credential from the State of California Commission of Teacher Credentialing.

6. Severity of injury refers to a lettered category of injury and subsequent treatment or disposition of the case defined as follows:

1. Category A, child went to an emergency room or to a private medical doctor.

2. Category B, child went home.

3. Category C, a telephone call was made to the party responsible for the child.

4. Category D, child was allowed to rest in the Nurse's Office.

5. Category E, child went back to class in less than 5 minutes.

7. Turfed playground is a playground of established grass (Webster, 1983, p. 1970).

8. Type of injury refers to a numbered category of types of different injuries as follows:

1. Orthopedic injury
2. Head injury
3. Abrasion/laceration
4. Ophthalmic injury
5. Dental injury

Research Design

Utilizing convenience sampling, the population of the study was all students visiting the School Nurse's Office for injury-related complaints at two elementary schools in central California during the 1988-1989 school year. Students in grades 1 through 6 were included in the study; kindergarten students were excluded since these students were confined to a separate play area away from the other students. The two schools were served by the same School Nurse and Health Clerk and had nearly equal numbers of students enrolled, one with 442 and the other with 460 students, excluding the kindergartners. Due to school

district policy and state and federal mandates, the schools were balanced according to student ethnic background and gender. One school had a turfed playground and the other a non-turfed playground. The playgrounds were nearly equal in size. Each school had the same number of recess minutes per day and incorporated similar rules and disciplinary measures for playground safety. Both schools' playgrounds were supervised by two school teachers and two yard duty personnel during recesses, lunch, before school, and after school. Playbox areas, including monkey bars, swings, redwood climbing structures, and slides, were present at both school sites. Injuries occurring to children in these areas were excluded from the study since the playbox surfaces were covered by tan bark.

The design of this study was descriptive and predictive using retrospective data. There were no control groups, and no interventions were performed on subjects. The study examined differences between two groups to determine whether the frequency and severity of injuries sustained in each category (orthopedic, head, abrasion/laceration, ophthalmic, and dental injuries) was different from what would be expected by chance (LoBiondo-Wood & Haber, 1986, p. 246).

Scope and Limitations

The major advantage of a predictive study is that it facilitates intelligent decision making because objective criteria are used to guide the process (LoBiondo-Wood & Haber, 1986, p. 134). This study's sample size of 902 was adequate, thus permitting the principle of randomization to work more effectively (LoBiondo-Wood & Haber, 1986, p. 216). The major disadvantage or limitation is that the design does not imply a cause-effect relationship between the independent predictor variables, turfed and non-turfed playgrounds, and the dependent variables, type and severity of injury. Allowances must also be considered for recording errors on the Nurse's Office Logs and possible discrepancies within the student population. Another possible limitation is variations in weather conditions affecting both playgrounds on a given day, such as wind or rain.

Chapter 2

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

This chapter presents the conceptual framework and review of literature. The first section presents the conceptual framework of Abraham H. Maslow's humanistic psychology. The second section presents the review of literature, followed by a summary.

Conceptual Framework

The conceptual framework for this study is based on Abraham Maslow's humanistic Positive Theory of Motivation. Maslow's theory is based on an individual's evolution and growth through a hierarchy of needs (Maslow, 1962, p. 21). He describes a progressive system of meeting human needs with an ultimate goal of achieving "self-actualization." Self-actualization is described as a highly individualistic need for freedom for the fullest development of one's talents and capacities (Maslow, 1954, p. 200). To attain this final goal, Maslow states that the self-actualized person must first fulfill the basic needs necessary for all human beings (1954, p. 80).

The first level is to fulfill basic needs. Basic needs are the physiological drives to attain homeostasis, that is, the body's automatic efforts to maintain a constant, normal state. Once the physiological drives are well gratified, Maslow identifies the next level of needs, the safety needs

(1954, p. 200). Protection, safety, and security are included in this second level of the hierarchy of needs. He suggests that this level of need is present for all human beings at all stages of life, but is best exhibited during infancy and childhood, because they do not inhibit their reaction to fear and pain as adults have often learned to do (Maslow, 1954, p. 85). Maslow states:

> As the child grows up, sheer knowledge and familiarity as well as better motor development make these dangers less and less dangerous and more and more manageable. Throughout life it may be said that one of the main conative [sic] functions of education is this neutralizing of apparent dangers through knowledge, e.g., I am not afraid of thunder because I know something about it. (1954, p. 85)

Another indication of the child's need for safety is a preference for some kind of undisrupted routine or rhythm. Children want a predictable, orderly world. Thus, a child with parents who are unfair, inconsistent, or unjust feels anxious and unsafe. The child needs an organized, safe world, rather than an unorganized or unstructured one (Maslow, 1954, p. 86).

If both the physiological and the safety needs are fairly well gratified, there will emerge the belonging needs (Maslow, 1954, p. 89). Love, affection, friendship, family, and a sense of community are necessary to proceed to the next level of the hierarchy.

The esteem needs are the final level before reaching the ultimate goal of self-actualization. Maslow states that all people in our society have a need or desire for a "stable, firmly based usually high evaluation of themselves, for self-respect, or self-esteem, and for the esteem of others" (1954, p. 90). Satisfaction of the needs for approval, dignity, recognition, importance, and appreciation leads to feelings of self-confidence, worth, strength, and adequacy, of being necessary in the world.

Goldstein (1939) coined the term self-actualization. Maslow's use of the term is much more specific and limited. He refers to self-actualization as "man's desire for self-fulfillment, namely to the tendency for him to become actualized in what he is potentially" (1954, p. 92). In 1971, after more than 20 years of research and personal evaluation, Maslow described eight ways in which one self-actualizes. First, he said, one must experience life fully, vividly, and selflessly with full concentration and total absorption, becoming wholly and fully human (1971, p. 44). Then, he described life as a series of choices, one after the other, where one must make progressive rather than regressive choices. To be a self-actualized person, you must know yourself and do what you believe, he said. Being honest and listening to yourself while doing well at what you want promotes the actualizing of self (Maslow, 1971,

p. 45). Finally, "opening oneself up to himself, finding out what he is, what he likes, what he doesn't like, what is good for him and what is bad" enables one to accept oneself for who he/she is, to become actualized (Maslow, 1971, p. 47). In order to become self-actualized, the physiological, safety, love, and esteem needs must first be met.

Maslow discusses the goal of education as being the self-actualization of a person, allowing children to become fully human and to be all that they can be. He describes "intrinsic learning" as learning to be a human being in general, and second, learning to be a particular human being (Maslow, 1971, p. 162). "Perhaps the most important thing the schools can do is to give children a sense of accomplishment" (Maslow, 1971, p. 181).

Review of Literature

Injuries are the leading cause of morbidity and mortality in children greater than 1 year old. Of these injuries, 20% are estimated to occur in and around schools (Sheps & Evans, 1987, p. 69). The National Health Interview Survey, conducted by the National Center for Health Statistics, found that more than 6,000,000 students were injured in and around schools in 1985 (Rowe, 1987, p. 426). In an appeal to educators to constantly observe safety hazards in school environments, McKenzie and Williams

reported that 43% of accidental death and 57% of accidental injury were connected with school life (1987, p. 284). In a study in Vancouver, British Columbia, the School Injury Surveillance Project found that the injury rate on playgrounds in both elementary and secondary schools was more than twice that of the next most frequent sites, sports areas and classrooms (Sheps & Evans, 1987, p. 71). In schools, the level of care owed increases in proportion to the potential danger of activities in which the students are placed, according to Mitchell (1990, p. 45). Noting that educators are not immune from the devastating effects of lawsuits resulting from school injuries, he proposed three obligations that educators owe students: (a) proper supervision, (b) proper instructions, and (c) properly maintained playgrounds and equipment. For more than 40 years, injuries have been recognized as the leading causes of childhood death (Garretson & Gallagher, 1985, p. 153). According to Frost, "among all the variables contributing to playground hazards, ground cover is number one" (1986). Using the National Electronic Injury Survey System, he found that the most common cause of serious injuries and deaths in children were falls to hard surfaces. The most desirable ground cover for open spaces, Frost said, is grass (1986).

In 1940, John Cate of the National Association of Public School Business Officials published a bulletin on

"Playground Surfacing." Written more than 50 years ago, the bulletin addressed problems relating to appropriate surfacing for playgrounds:

> It is recognized that both children and adults are bound to fall while playing, so the surface should be of such texture as to reduce abrasions and bruises to a minimum. The surface should be compact enough to prevent excess dust as it is both unhealthful and unpleasant to play on areas which are dusty when dry. The surface should not only be free from dust but should not injure clothing or soil excessively if either persons or clothing come in contact with it. (p. 28)

He went on to discuss "natural earth surfaces," such as dirt and gravel, on which it is difficult to play active games and which "cuts and bruises children who fall on it" (Cate, 1940, p. 28). Cate (1940) concluded that turf was the most ideal surface for most forms of children's play.

Summary

Research has documented the growing body of data on playground injuries and death. Playground surfaces have been shown to be directly related to severity of injury (Frost, 1986). This research study was done to explore the relationship of two different playground surfaces, turfed and non-turfed, and the type and severity of injury to children at two elementary schools.

Chapter 3

METHODOLOGY

This chapter presents the research methodology used in this study. Included in the methodology is a description of the population, method of data collection, procedures, and data analysis.

Research Design

The design was a descriptive predictive study, utilizing retrospective data. The study examined differences between two groups to determine whether the frequency and severity of injuries sustained in each category (orthopedic, head, abrasion/laceration, ophthalmic, and dental injuries) is different from what would be expected from chance (LoBiondo-Wood & Haber, 1986, p. 246).

Population

The population of the study was composed of 902 students who attended two elementary schools during the 1988-89 school year. The data collected consisted of the type and severity of injury visits recorded in the Nurse's Office at the two schools. The schools were located in a semi-rural central California town with a population of 26,000 people. The socio-economic level of this town is mixed. Occupations include farm laborers, local business people, and commuters. The population is approximately 50% Hispanic and is heavily involved in seasonal and/or

temporary work in the agribusiness industry. According to the local realtors' organization, the median selling price for a single family home was $281,000 for February, 1990; however, according to the 1980 U.S. Census, 29.4% of the household incomes in the community were below the poverty level.

The school district enrollment for 1988-89 was 8,450. In December, 1988, the school district identified 11% (n = 955) of the students were from families receiving Aid to Families with Dependent Children (AFDC). The number of students receiving free or reduced price lunches, another indicator of low income status, was 2,733 or 32% of the population of students (Arnold, 1989). The public school district in this community has eight elementary schools, one junior high, one high school, and one continuation high school. The school-age population is 54% Hispanic and 46% Anglo-American/Other. Approximately 6% of the students (and their families) had limited English proficiency in 1989 (Arnold).

Sample

Students in grades 1 through 6 were included in the study since all students in these grade levels shared the same playground. The square footage of the two playgrounds was comparable. One was 115,000 square feet; the other was 100,000 square feet. The only difference in the playgrounds

at the two school sites was that one was landscaped and one was not. One school had an established playground of turf with Bermuda grass maintained by school district personnel; the other school had no turf on its playground, only its natural habitat. The non-turfed playground was comprised of dirt, rock, a few scattered weeds, and some occasional construction debris left from the school's construction 3 years ago. School staff had attempted to clear this debris from the playground. Nevertheless, nails, wires, and occasional small chunks of concrete were on the surface of the dirt due to erosion. Loose gravel and blowing dust were other hazards of this non-turfed playground.

The ethnic backgrounds of the students enrolled at the two schools were similar. The school with the turfed playground was 49% Hispanic, 51% White/Other; the school with the non-turfed playground was 48% Hispanic, 52% White/Other. The male/female ratio at both schools was equal, 55% male and 45% female.

Children at both schools had equal recess minutes each school day and the same number of minutes during lunch time. Recesses included a 10 minute morning and a 15 minute afternoon recess. During lunch time, 15 minutes were allowed for children to eat their lunches followed by 30 minutes of free play during both school lunch periods. According to School District policy, no children were to

arrive on campus more than 15 minutes before school began nor were they allowed on school grounds for more than 15 minutes after school. Students who rode buses were supervised by yard duty personnel while waiting in line for their buses. At both schools, morning and afternoon recess times were supervised by two school teachers and two yard duty personnel. Before school, after school, and lunch periods were supervised by four yard duty personnel. Both schools had a weekly 25 minute physical education period taught by a Physical Education teacher in grades 4 through 6. The two schools were served by the same School Nurse and Health Clerk. The total number of school days per academic year at each school was 180.

Method of Data Collection

Written permission for the study was obtained from the School District's Assistant Superintendent (Appendix A) and the Director of Health Services (Appendix B). San Jose State University's Human Subjects Institutional Review Board gave approval for the study (Appendix C). Additionally, the principals of the two schools selected for study were advised of the research to be undertaken and their cooperation was elicited (Appendix D). The "School Yard Injury Data Collection Form," developed by the researcher, incorporated the information available on the Nurse's Office Log (Appendix E). The format was designed to facilitate

efficient, accurate, and objective collection of information. The validity of the instrument was established by two clinical expert opinions, a Director of Health Services and an experienced School Nurse. A Health Clerk who had worked in the School Nurse's Office for 4 years was interviewed to facilitate accuracy in the development of the instrument. A statistician employed at a local university was consulted to assure proper format of the instrument and to simplify statistical analysis at the completion of data collection. Utilizing the Nurse's Office Logs, the severity of injury data was recorded according to the disposition of the case using the following key with "A" being the disposition for the most severe injuries and "E" being the disposition for the least severe injuries:

1. A indicated the child went to an emergency room or to a private medical doctor (ER/PMD).

2. B indicated the child went home (home).

3. C indicated a telephone call was made to the party responsible for the child, i.e., the parent, guardian, or emergency contact (T/C).

4. D indicated the child was allowed to rest in the Nurse's Office (rest).

5. E indicated the child went back to class in less than 5 minutes (BTC).

The above classification was developed because this data were recorded for each child who was seen in the Nurse's Office at both schools and was documented on the Nurse's Office Log.

The type of injury was recorded according to the following categories:

1. Orthopedic injury indicated a contusion, pain, possible strain, sprain, or fracture of a joint or an extremity.

2. Head injury indicated any trauma about the head.

3. Abrasion/laceration indicated any of such on any part of the body.

4. Ophthalmic injury indicated any complaint related to the eye, with the exception of infectious or allergic processes.

5. Dental injury indicated any trauma to the mouth involving the teeth, such as bleeding gums due to trauma, or chipped, missing, or painful teeth.

The grade level and sex of each student studied was recorded on the data collection form to obtain demographic data for the sample. A total of 20 students did not have grade level recorded; for reliability of information, these students were excluded from the study.

Data were collected during May of 1990 at each school site. Utilizing the "School Yard Injuries Data Collection

Form," the Nurse's Office Logs were retrospectively reviewed. A total of 116 pages of Nurse's Offices Logs were reviewed during data collection. A total of 1,267 injuries were categorized according to the type of injury and degree of severity of injury using the keys previously described. The data collection period was the entire 1988-89 academic year, from September 5, 1988, through June 13, 1989, for a total of 180 school days.

Data Analysis

The purpose of the analysis of data was to answer the following questions:

1. Is there a difference between the severity of injuries on turfed and non-turfed playgrounds?

2. Is there a difference between the types of injuries on turfed and non-turfed playgrounds?

3. Is there a difference between the number of injury-related Nurse's Office visits resulting from injuries on turfed and non-turfed playgrounds?

All data collected, using the methods previously described, were analyzed using the chi-square test of differences for the scores on each of the above three questions. The chi-square test of differences was used on scores between the following groups from each school:

1. Severity of injuries on students using turfed playgrounds and non-turfed playgrounds.

2. Types of injuries sustained by students using turfed playgrounds and non-turfed playgrounds.

3. Numbers of injury-related Nurse's Office visits occurring in a school with a turfed playground and a school with a non-turfed playground.

The severity of injuries were analyzed by counting the total number of each category. Totals were compared for a turfed and a non-turfed playground and percentages were calculated for each category of severity of injury for the two types of playgrounds. The chi-square test of differences was then applied to the scores for each type of playground to determine statistical significance between the groups.

The types of injuries sustained on two types of playgrounds, turfed and non-turfed, were tabulated for each of the playgrounds. The types of injuries were categorized as follows: (a) orthopedic injury, (b) head injury, (c) abrasion/laceration, (d) ophthalmic injury, (e) dental injury. Types of injury were totalled for each school, thus providing data regarding type of injury as it relates to turfed and non-turfed playgrounds. Percentages of the total number of injuries, according to type, were obtained for both turfed and non-turfed playgrounds. A chi-square test of differences from the scores of the two groups, those injuries occurring on turfed and on non-turfed playgrounds,

was done to determine if there was a statistical significance between the two groups.

Finally, the total number of injury-related Nurse's Office visits were tabulated at each of the two schools studied. These totals were compared to see if there were more or less injuries on one type of playground than the other.

The $P < .05$ level of confidence was used to accept significant differences. Results are reported in Chapter 4.

Chapter 4

ANALYSIS AND INTERPRETATION OF THE DATA

This chapter presents the analysis and interpretation of data obtained from this study. A total of 1,267 injury-related Nurse's Office visits were examined for type of injury and severity of injury in two similar elementary schools, one with a turfed playground and the other with a non-turfed playground. Regardless of playground surface, results indicated that boys were injured more frequently than girls, and older children, grades 3 through 6, had more injuries than younger children (Table 1).

Analysis of the Research Questions

The chi-square test of differences was used with the three research questions. The $\underline{P} < .05$ level of confidence was used to accept significant differences.

Question 1: Is there a difference between the severity of injuries as measured by the disposition of the case on turfed and non-turfed playgrounds? The results indicated that there is evidence in this study to indicate that severity of injury and type of playground surface are related to each other [Chi-squared (4) = 15.794, $\underline{P} = .0014$]. A microanalysis suggests that there are significantly more telephone calls to the parent, guardian, or emergency contact when the injury occurs on a non-turfed playground ($\underline{P} < .01$) (Table 2 and Figure 1).

Table 1

Demographic Characteristics of the Sample (N = 1,267)

	Turfed Playground School (n = 645)		Non-Turfed Playground School (n = 622)	
Sex	n	%	n	%
Males	401	62	379	61
Females	244	38	243	39
Grade Level	n	%	n	%
1	35	5	24	4
2	81	13	73	12
3	154	24	135	22
4	162	25	141	23
5	98	15	128	20
6	115	18	120	19

Table 2

Chi-Square Test of Differences

Severity of Injury and Type of Field

	ER/PMD	Home	T/C	Nurse	BTC	Row Total
Raw Count	0	45	69	15	516	645
Row Pct.	.0%	7.0%	10.7%	2.3%	80.0%	50.9%
Col. Pct.	.0%	58.4%	39.9%	35.7%	53%	
Raw Count	2	32	104	27	457	622
Row Pct.	.3%	5.1%	16.7%	4.3%	73.5%	49.1%
Col. Pct.	100.0%	41.6%	60.1%	64.3%	47.01%	
Column Total	2	77	173	42	973	1,267
	.2%	6.1%	13.7%	3.3%	76.8%	100%

Chi-Square	D.F.	Significance
17.87027	4	.0013

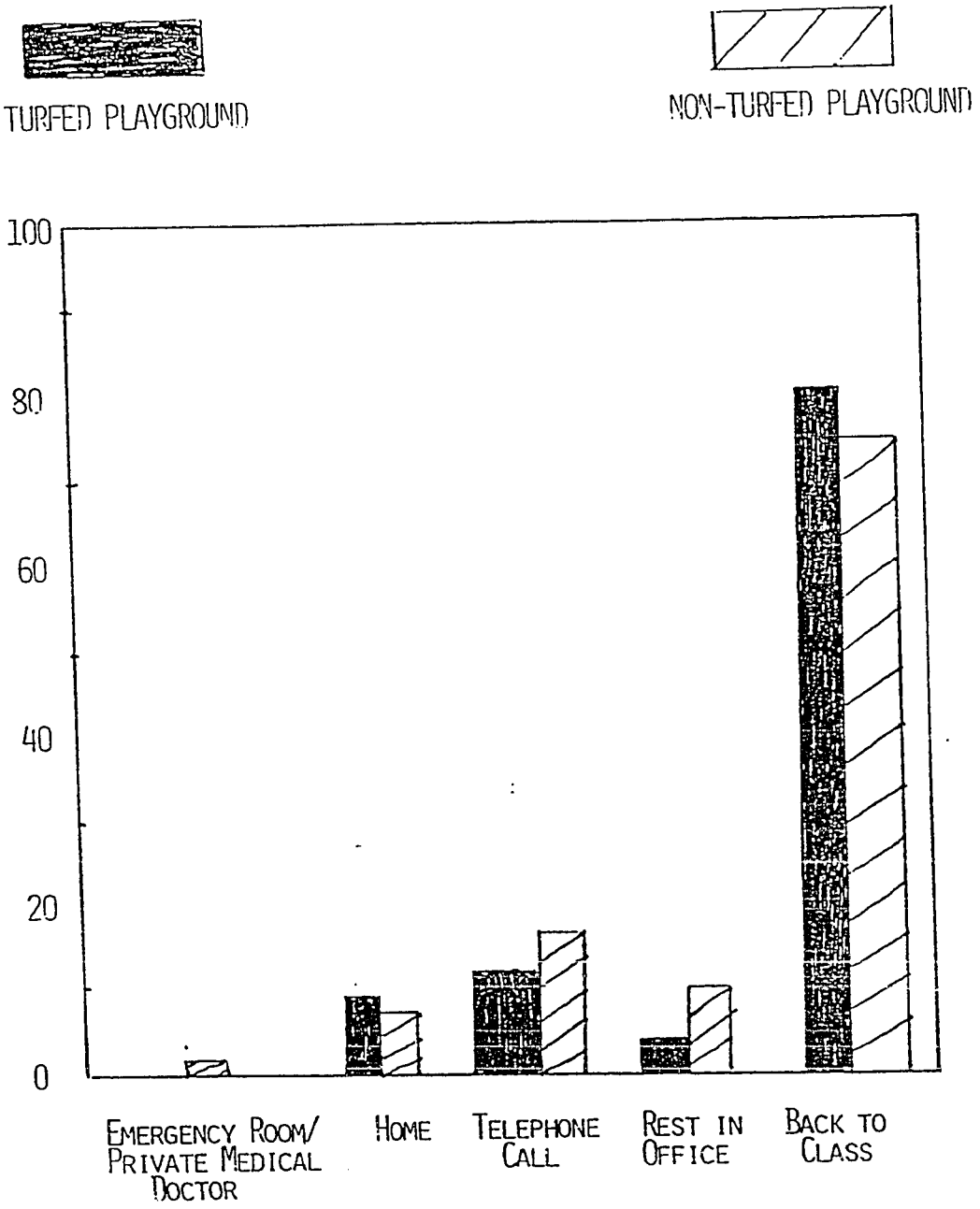

FIGURE 1. PERCENTAGE OF SEVERITY OF INJURY ACCORDING TO PLAYGROUND SURFACE.

Question 2: Is there a difference between the types of injuries on turfed and non-turfed playgrounds? There is evidence from this study to indicate that the type of injury and the type of playground turf are associated with each other [Chi-squared (4) = 100.63, $\underline{P} < .0001$]. A microanalysis suggests the following:

1. On turfed playgrounds, there are significantly more orthopedic injuries ($\underline{P} < .0001$).

2. On turfed playgrounds, there are significantly more eye injuries ($\underline{P} < .02$).

3. On non-turfed playgrounds, there are significantly more abrasions and lacerations ($\underline{P} < .0001$) (Table 3 and Figure 2).

Question 3: Is there a difference between the number of Nurse's Office visits resulting from injuries on turfed and non-turfed playgrounds? The difference in the number of injuries on the two playgrounds was not statistically significant. Fifty one percent of the Nurse's Office visits resulted from injuries on the turfed playground. Forty nine percent of injury related visits occurred on the non-turfed playground. There is no evidence from this study to indicate that there are more or less Nurse's Office visits resulting from injuries on one type of playground than another.

Table 3

Chi-Square Test of Differences

Type of Injury and Type of Field

	Ortho	Head	Abr/Lac	Optha	Dental	Row Total
Raw Count	306	89	182	63	5	645
Row Pct.	47.4%	13.8%	28.2%	9.8%	.8%	50.9%
Col. Pct.	66.7%	46.1%	35.8%	64.3%	55.6%	
Raw Count	153	104	326	35	4	622
Row Pct.	24.6%	16.7%	52.4%	5.6%	.6%	49.1%
Col. Pct.	33.3%	53.9%	64.2%	35.7%	44.4%	
Column Total	459	193	508	98	9	1,267
	36.2%	15.2%	40.1%	7.7%	.7%	100%

Chi-Square	D.F.	Significance
100.71148	4	.0000

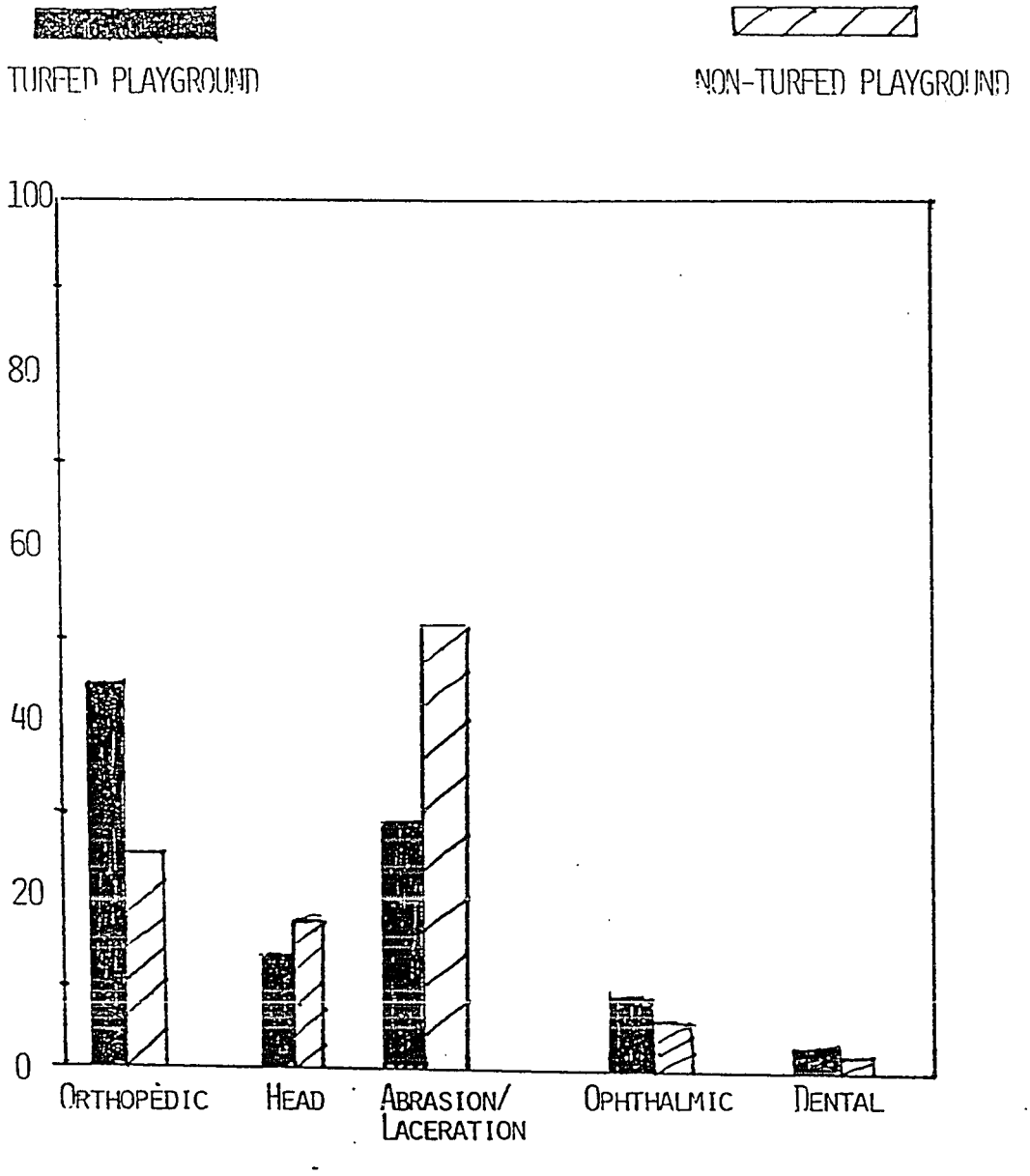

FIGURE 2. PERCENTAGE OF TYPE OF INJURY ACCORDING TO PLAYGROUND SURFACE

Chapter 5

CONCLUSION AND RECOMMENDATIONS

This chapter presents the conclusions of this research study, recommendations for further research, and implications for the role of the school nurse. The purpose of this study was to examine three factors associated with school yard injuries on two types of playgrounds, turfed (grass) and non-turfed (dirt/gravel). Injury related Nurse's Office visits of students from 2 elementary schools were reviewed to assess if there was a difference between the following three factors:

1. Severity of injuries on students using turfed playgrounds and non-turfed playgrounds,

2. Types of injuries sustained by students using turfed playgrounds and non-turfed playgrounds,

3. Numbers of injury-related Nurses's Office visits occurring in a school with a turfed playground and a school with a non-turfed playground.

Conclusions

Results from this study indicated that boys were injured more frequently than girls, as previous literature had also found (Felman, Woodward, & Grimes, 1983, p. 1279). Boys traditionally engage in more active, contact play than girls, often making themselves more susceptible to injury. Injuries were most frequent in children in grades 3 through

6 in both schools. Level of activity and game skills tend to increase with age as does size and strength, thus providing more opportunity for injury.

Research Question 1 was as follows: Is there a difference between the severity of injuries, as measured by the disposition of the case, on turfed and non-turfed playground? The results of this study indicated that there is a difference between the severity of injury on turfed and non-turfed playgrounds. Specifically, there are more telephone calls made to responsible parties for children injured on non-turfed playgrounds than on turfed playgrounds. This finding coincides with the literature which describes the importance of playground surfacing and its effects on the severity of injuries.

Research Question 2 was as follows: Is there a difference between the types of injuries on turfed and non-turfed playgrounds? This study indicated a difference by documenting that the type of injury and type of playground surface, turfed and non-turfed, are related to each other. Specifically, orthopedic and eye injuries occurred more frequently on turfed playgrounds. The possible explanations for the increase in orthopedic injuries might be that: (a) children play and run harder on a turfed surface than on a non-turfed one, (b) there may be potholes in the turfed playground that are camouflaged by

the turf which may cause injury when children are moving, and (c) sprinkler heads on turfed playgrounds may cause tripping when running or walking. The increase in eye injuries on the turfed playground may be related to more active play and thus more balls hitting the facial area. On non-turfed playgrounds, the study found there were significantly more abrasions and lacerations than on turfed playgrounds. This finding would seem logical due to the tearing and scraping qualities of the rocks and gravel found on non-turfed playgrounds. The gravel and dirt provide minimal traction for running or quick movements frequently associated with healthy school children, and thus, falls causing abrasions or lacerations are more common than on turfed playgrounds.

Research Question 3 was as follows: Is there a difference between the number of injury-related Nurse's Office visits resulting from injuries on turfed and non turfed playgrounds? The results of this study indicated that there was no significant difference in the number of Nurse's Office visits due to injuries on the turfed and non-turfed playgrounds.

Recommendations for Further Research

The information from this study suggests the need to continue to investigate the effects of playground surfaces on the severity and type of injuries to school children.

Recent literature is somewhat limited, perhaps because it is assumed that school districts are aware that turf is apparently safer for children than non-turfed playgrounds. More studies of this type, on a larger sample of all the schools in a school district, county, state, or nationwide, would seem worthwhile to further understanding and prevention of the problem.

Implications for School Nursing Practice

The results of this study stress the importance of personnel training in first aid techniques to assure optimal care for injured children during school hours. With continuing school budget cuts, the professional School Nurse is responsible for increasing numbers of children, thus dramatically decreasing nursing hours at all school sites. Hence, school secretaries, teachers, and other school personnel must be capable of providing interim care in the event of school injury. Liability issues must be addressed and plans of action established to facilitate the "in loco parentis" statute mandated by the State Education Code to assure the safety of children in school. A partnership between school districts and the insurance industry may alleviate concerns regarding the protection of children during the school day. The insurance industry might sponsor safety education programs on injury prevention for school

personnel, thereby decreasing potential medical liability claims due to playground injuries.

Modifications in types of school play on the two different playgrounds may be necessary to provide a safer play environment. Close monitoring of contact sports, particularly on the turfed playground, seems necessary to decrease orthopedic and ophthalmic injuries. Perhaps additional yard supervisors would reduce the overall injury rate.

At the non-turfed playground school, more nursing hours may be required to assure proper wound care for the many abrasions and lacerations sent to the Nurse's Office. A study of the time required to care for different types of injuries may demonstrate this need more clearly for school administrators with the responsibility of allocating health services.

The researcher's "School Injuries Data Collection Form" could be used by School Nurses to assess their own school's type and severity of injuries on playgrounds. Grade level information could be obtained to see which grades may benefit by employing a safety promotion program. A safety contest between classrooms could be developed to see which students could lower their percentage of playground injuries the most.

The School Nurse provides the only professional health services available during a child's school day. A closer look at the potential liability and financial issues to which a School District is susceptible without appropriate emergency care for children should serve to be an important factor in convincing administrators of the need for professional School Nurses.

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APPENDICES

APPENDIX A

Permission Letter

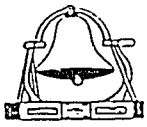
for

Record Review From

School District Assistant Superintendent

Unified School District

. SUPERINTENDENT



Serving the Youth of *Since 1852*

TELEPHONE (408) 847-2700

April 18, 1990

Katherine Harper, RN

Dear Ms. Harper:

I am writing in response to your letter requesting access to the School Nurses' student logs for and Schools in our District. I have discussed your request with Ms. Coordinator of Health Services. She and I concur on granting you this permission.

We look forward to reviewing results of your study upon its completion. Good luck with your research.

Sincerely,

, Assistant Superintendent,
Curriculum and Instruction

BOARD OF EDUCATION

APPENDIX B

Permission Letter

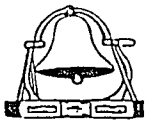
for

Record Review From

School District Director of Health Services

Unified School District

SUPERINTENDENT



Serving the Youth of *Since 1852*

TELEPHONE
FAX

April 18, 1990

Katherine Harper, RN

Dear Ms. Harper:

I have received your letter requesting access to the School Nurse's logs for and Schools in our District. I am pleased to grant this permission to you. I have discussed your letter of request with , Assistant Superintendent, and he concurs.

Please feel free to contact me with any questions in the future. Best of luck with your research!

Sincerely,

Coordinator, Health Services

BOARD OF EDUCATION

APPENDIX C

Approval by Human Subjects Institutional Review Board

SJSU SAN JOSE STATE UNIVERSITY

A campus of The California State University

Office of the Academic Vice President • Associate Academic Vice President • Graduate Studies and Research
One Washington Square • San Jose, California 95192-0025 • 408/277-2943

To: Katherine Harper, RN

From: Charles R. Bolz
Office of Graduate Studies and Research

Date: May 7, 1990

As required by University policy, the Human Subjects Institutional Review Board has reviewed your proposed project entitled:

"Severity of School Yard Injuries on Turfed vs. Non-Turfed Playgrounds"

Because your project is to be limited to the collection of existing data that cannot be identified with human subjects, your project is exempt from further review. Therefore, you may proceed without further review by the Human Subjects Institutional Review Board.

I, however, do caution you that whenever people participate in your research as human subjects, they should be appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity with regard to any and all data that may be collected from the subjects. If at any time a subject becomes injured or complains of injury, you must notify Dr. Serena Stanford immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging information.

Please also be advised when people participate in your research as human subjects, each subject needs to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate or withdrawal will not affect any services the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact Dr. Stanford or me at (408) 924-2480.

cc: Virginia Young, Ph D

APPENDIX D

Informational Letter

to

School Principal

, Principal
School

April 22, 1990

Dear Mr. :

I am a Master's degree candidate at San Jose State University studying the type and severity of school injuries on two types of playgrounds, turfed and non-turfed. I have obtained permission from your School District's administration to obtain data from the School Nurses's Office logs for use in my study.

I will be on your campus in the Nurses's office after school hours to collect the data and will not disrupt school routine procedures. If you have any questions, please feel free to contact me at or I will see you on your campus beginning May 1, 1990.

Thank you for your consideration.

Sincerely,

Katherine J. Harper, RN

APPENDIX E

School Yard Injury

Data Collection Form

School Injuries

DATA COLLECTION FORM

Type of Injury	Disposition					Grade Level	Sex	Data Collection Date	Comments
	BTC	Rest	T/C	Home	PMD				
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									
TOTALS:									

KEY:

Type of Injury:
1: Orthopedic
2: Head
3: Abrasion/Laceration
4: Ophthalmic
5: Dental

Disposition:
BTC: Back to Class within 5 minutes
Rest: Quiet rest in office for greater than 5 mir
T/C: Telephone call to responsible party
PMD: Doctor visit
Home: Parent/Responsible party picks up